

Island Fox Recovery Coordination Group

DRAFT RESPONSE TO

Technical Analysis 3.6: Assessment of the potential benefits and costs of long-term captive populations on the mainland and/or islands

Executive Summary

The RCG wishes to express profuse thanks to the members of Task Force 3.6 for producing such a thorough and thought-provoking analysis in such a short time.

A mainland population of island foxes could potentially increase the size of captive population that could be supported to improve gene retention and produce more animals for eventual release, facilitate urgently-needed research to improve population growth rates in all captive populations, and provide a long-term insurance against extinction of one or more island populations.

Since all of the populations are small, attempting to manage wild, island captive, and mainland sub-populations of a subspecies as a single metapopulation would probably compromise population growth rate and should be avoided in the short term. Since maintenance of genetically viable mainland populations of all listed subspecies is likely to be cost prohibitive, one or two subspecies would need to be selected for mainland breeding.

We recommend that plans and protocols be developed, as a matter of urgency, for moving foxes from island to mainland captive breeding facilities. This process could begin before a final decision is taken on which subspecies to move.

We propose that the entire captive population on Santa Rosa be moved to a small number of high capacity mainland captive breeding facilities, as soon as possible. Resources freed up by this move should ideally be used to improve and expand captive breeding efforts and wild population monitoring on San Miguel. This recommendation is based upon the estimated threats to the wild and captive populations, and the most likely timeline for mitigating those risks. However, this ranking could be influenced by rapid changes in threat status, for example through effects of pig eradication on eagle predation throughout the northern islands. Moreover, we acknowledge that San Miguel is the most remote of the islands and the most difficult and costly location for captive breeding.

We also recommend that, on a slightly longer timescale, plans be developed and implemented to establish a population of Santa Cruz island foxes in mainland zoos, to act as a long term insurance against extinction.

Acknowledgement

The RCG wishes to express profuse thanks to the members of Task Force 3.6 for producing such a thorough analysis in such a short time period. Their document has been extraordinarily valuable not only in providing information, but also in greatly clarifying thinking on this important issue.

Roles of a mainland population

A mainland population of island foxes from one or more of the listed subspecies could potentially play several roles. The relative importance of these roles for island fox conservation influences recommendations concerning whether such a population should be founded, and also which subspecies should be included. These potential roles include:

- **Increased capacity** for the captive populations. None of the island facilities is large enough to maintain a population that is viable in the long term. This reflects the history of the facilities, which were constructed to deal with acute threats to the wild populations, and were never expected to be used over the long term. Given the small numbers of founders, maximum gene retention requires growing the populations as rapidly as possible. The small size of the facilities (sufficient to support approximately 20 pairs of foxes on each of the northern islands) and low breeding success both hinder absolute rates of population growth. Moreover, the facilities are too small to produce sufficient recruits both to maintain the captive population itself, and to provide animals for eventual release. Island captive facilities could be expanded, but this would stretch the capacity for accommodating the necessary additional pens, keepers, veterinarians etc, particularly on the smaller and more remote islands.
- A **research population** which could be used to develop methods for improved conservation of island foxes. Techniques are needed urgently to improve breeding success in captivity; less critically, captive animals also important for developing methods such as emergency vaccination protocols. While we would expect that these methods, where appropriate, would be applied to the management and conservation of island populations, the substantially greater accessibility of a mainland facility would make it far easier, and less costly, to develop techniques rapidly.
- A **'safety net'** to be maintained in the long term. Even if potentially viable wild populations of all subspecies are restored, all of the populations will remain small and at chronic risk of extinction. A mainland population could provide a source of animals that could be used for reintroductions in future decades, should further catastrophic declines or local extinctions occur. Such a population would need to be maintained in perpetuity. While USFWS has a remit to conserve all of the listed subspecies, we note that it would probably be cost-prohibitive to maintain mainland populations of all subspecies; hence the assumption would be that some hypothetical future releases might necessarily involve foxes of non-native subspecies. Given the need to conserve ecosystem function, which undoubtedly includes presence of a system's largest terrestrial carnivore, we would consider re-establishment of fox populations using non-native subspecies preferable to leaving islands without foxes. The behavioural flexibility of small canids, and the high survival of captive bred fox pups released in areas without aerial predators, suggest that hypothetical future releases involving non-native subspecies would stand a reasonably high chance of success. We also note that, assuming recovery of at least some of the wild populations, the islands themselves also provide 'backup' populations that could provide animals for release should any subspecies become extinct in future.

We consider all of these roles to be important for long term conservation of island foxes. The ability of a mainland population to provide increased capacity for captive populations, and to facilitate critically important research on causes of reproductive failure have especially immediate priority, but we also acknowledge the value of a long-term ‘safety net’ for conservation of the species as a whole.

How would a mainland population be founded?

It is extremely unlikely that viable captive populations of all four listed subspecies could be maintained on the mainland, simply for reasons of space and cost. Smaller mainland populations could in theory be managed as components of metapopulations which included wild and captive foxes on the islands, with animals moving between sub-populations to conserve genetic diversity within a larger metapopulation. However, given the extremely small sizes of the populations at present, the stress and disease risks associated with moving animals, and the need to retain survival skills of wild-born animals, attempting to maintain wild, island captive, and mainland sub-populations of multiple subspecies would be very likely to compromise population growth rates and the conservation of genetic diversity. Hence, we conclude that a mainland population would best be formed by closing down one or more of the on-island facilities and moving all of those animals to the mainland. We appreciate that, once this move had been made, it would take several years for the mainland population to grow large enough to produce sufficient recruits to start returning animals to the island(s). On-island facilities would still be maintained in case a need arose to take wild animals into captivity – for example in the event of increased eagle predation – and also as acclimation pens for future releases.

What sort of mainland facility?

The Task Force provided a very helpful evaluation of the types of mainland facility that could be used to house and breed island foxes. We agree that a dedicated breeding facility would be most appropriate for rapid growth of a captive population, and to facilitate the research that would be a critical component of achieving rapid population growth. Involvement of zoos could also be appropriate for the long term maintenance of a mainland population as a ‘safety net’.

Which subspecies?

As discussed in the Task Force’s excellent analysis, the choice of one or more subspecies to form a mainland population depends absolutely upon the goals of establishing such a population. In the context of the potential roles we have outlined above, the Task Force argue very convincingly that the immediate ‘rescue need’ is greatest for San Miguel and Santa Rosa, while the Santa Cruz subspecies is most appropriate as a redundant ‘safety net’ population for long term restoration of fox populations on any of the islands following a hypothetical future subspecies extinction.

As discussed by the Task Force, the choice of subspecies also needs to take into account the status of the wild populations. Of the four listed subspecies, the most viable wild population is on Santa Catalina, and the chances of successful release of captive bred animals is highest on this island. However, since establishing a mainland population of Catalina foxes would require removing wild born animals from a small but growing

wild born population, we consider this subspecies to have the lowest priority for a possible move to the mainland.

Among the northern islands, all of the captive populations are small, and all of the wild populations are highly threatened. Nevertheless, available data indicate variation between islands in the criticality of those threats. The wild population on Santa Cruz is small (fewer than 100 animals) but appears to be growing slowly. This population is composed almost entirely of wild born animals and preliminary data suggest that these animals may show behavioural differences (e.g. less diurnal behaviour) that we speculate may reduce their vulnerability to eagle predation. However, it has been proposed that the ongoing pig eradication on Santa Cruz could exacerbate predation on foxes, and this possibility cannot be discounted. The wild population on Santa Rosa is tiny (fewer than 20 animals) and extremely vulnerable; five of 13 animals released in fall 2004 were killed by golden eagles, and the remaining animals were not recaptured only because of a reluctance to disrupt possible breeding attempts. Other golden eagle prey remain on Santa Rosa in the form of deer and elk. The wild population on San Miguel is still smaller. While to date there have been no eagle predations of San Miguel foxes released in 2004, the habitat is very open and one or two excursions by the golden eagles known to use neighbouring Santa Rosa island could potentially eliminate the population. Hence, available data appear to suggest that the wild population on Santa Cruz is least likely to go extinct in the next few years, and that on Santa Rosa is most at risk. These relative rankings of risk are also affected by possible events such as effects of pig eradication on eagle predation rates, success or failure of golden eagle capture efforts, and unforeseen disease outbreaks, the probability of which cannot be predicted.

Given the critical and urgent need for rapid population growth of the Santa Rosa and San Miguel subspecies, and the relative (we stress – *relative*) safety of the wild population on Santa Cruz, we conclude that the most appropriate action at this time would be to move the captive population from either San Miguel or Santa Rosa to a small number of high capacity mainland captive breeding facilities, as soon as possible. We also recommend that, over a slightly longer time period, a mainland population of Santa Cruz island foxes be established in mainland zoos to act as a longer term insurance against the extinction of this and other subspecies. We acknowledge that moving one of the subspecies with the historically least successful record of captive breeding risks failure, and that conservation of the species as a whole might be better served by adopting a triage approach, focusing attention on a more promising subspecies such as Santa Cruz. However, USFWS has a mandate to conserve all four listed subspecies. Moreover, such a triage approach would likely entail providing less than adequate facilities for the most threatened subspecies, even though other species and subspecies have been successfully recovered from conditions which appeared equally unpromising. We quote Michael Soulé: “*there are no hopeless cases, only people without hope, and expensive cases*” and argue that, while there is hope, conservation efforts should continue to be directed at the most critically endangered subspecies.

The choice between Santa Rosa and San Miguel is somewhat more complex. Given the recent rate of eagle predation on free ranging Santa Rosa foxes, restoration of this subspecies in the wild is likely to be truly successful only if resident golden eagle can be removed completely. Experience suggests that this may take several years; hence moving the captive population to the mainland, in the full knowledge that it would

probably be several years before animals became available for release to the wild, would provide an opportunity for removing the major threat to this subspecies. By contrast, current conditions suggest that there may be a chance of being able to grow the San Miguel population more rapidly by further releases – assuming that golden eagles continue absent from San Miguel, and no other catastrophic events (such as disease outbreaks) occur. Hence, the biological conditions tend to argue in favour of removing captive animals from Santa Rosa to a mainland breeding facility, and using the resources freed up by this to expand and improve the facilities on San Miguel. However, the remoteness of San Miguel make this the most costly of all the islands on which to conduct captive breeding.

As mentioned earlier, this relative ranking of priorities for the the three northern subspecies could be influenced by outside events (e.g. effects of pig eradication on eagle predation); hence we suggest that plans be developed immediately for moving animals to the mainland (including discussions with mainland captive breeding facilities and zoos), before a final decision is taken concernign which subspecies should be moved.

DRAFT
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4th June 2005